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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/098,617	03/18/2002	Masayuki Sakakura	12732-094001 / US5593/561	3682

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EXAMINER	
ARTMAN, THOMAS R	
ART UNIT	**PAPER NUMBER**
2882	

DATE MAILED: 06/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/098,617	SAKAKURA ET AL.	
	Examiner	Art Unit	
	Thomas R. Artman	2882	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/04/2005*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on May 4th, 2005, has been entered.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on May 4th, 2005, was filed after the mailing date of the Request for Continued Examination on May 4th, 2005. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner. Please see the attached PTO-1449 with the examiner's initials, signature and date of consideration.

Allowable Subject Matter

The indicated allowability of claims 2-7 is withdrawn in view of the newly discovered reference(s) to Yamada (US 6,246,179 B1). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-4, 14-16, 35-37, 41-43 and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada (US 6,246,179 B1) in view of Miyauti et al. (JP 11-31587).

Regarding claims 2-4, Yamada discloses a light-emitting device (Figs.4A-4B), including:

a) a first electrode 61 formed on an insulating surface 17,

b) a first insulating layer 19 covering an end portion of the first electrode and comprising a tapered edge θ1,

c) an organic compound layer 66 formed on the first electrode, and

d) a second electrode 67 formed on the organic compound layer.

Yamada does not specifically disclose the use of a second insulation layer between the first electrode and the organic compound. As a result, there is no tunneling current between the first electrode and the organic compound layer, and the first electrode is directly connected to the organic compound layer.

Miyauti specifically teaches the practice of depositing a thin insulation layer 3 (made of DLC) between a first electrode 2 and an organic compound layer 4 and 5 in a light-emitting device. The DLC layer is chemically stable and thus shields the organic compound layer from the instabilities of the ITO electrode 102, see par.0036 of Miyauti. The examiner notes that the

first electrode 61 of Yamada is also made of ITO, and thus would suffer the same drawback identified in Miyauti.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the light emitting device of Yamada to have a thin insulation layer between the first electrode and the organic compound layer as shown by Miyauti in order to improve the stability and longevity of the pixel, as taught by Miyauti. As a result of the addition of this layer, tunneling currents result and the first electrode is not in direct contact with the organic compound layer.

With respect to claims 14-16, the insulating layer of Miyauti has carbon as a main component.

With respect to claims 35-37, the insulating layer of Miyauti (DLC layer 3) has thicknesses overlapping the range of 1-10 nm thick (par.0033, Table 1).

With respect to claims 41-43, the insulating surface 17 of Yamada is made of at least a polyimide or acrylic resin (col.6, lines 2-4).

With respect to claims 47-49, the light emitting device of Yamada is capable of being used for computers, digital cameras, video cameras and mobile phones. The examiner notes that such limitations result in an intended use of the light emitting device that carry no structural distinction over the prior art of record. Such limitations carry no patentable weight.

Claims 2-4, 8-10, 14-16, 35-37, 41-43 and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada in view of Nagayama et al. (JP 11-224781).

Regarding claims 2-4, Yamada discloses a light-emitting device (Figs.4A-4B), including:

a) a first electrode 61 formed on an insulating surface 17,

b) a first insulating layer 19 covering an end portion of the first electrode and comprising a tapered edge θ1,

c) an organic compound layer 66 formed on the first electrode, and

d) a second electrode 67 formed on the organic compound layer.

Yamada does not specifically disclose the use of a second insulation layer between the first electrode and the organic compound. As a result, there is no tunneling current between the first electrode and the organic compound layer, and the first electrode is directly connected to the organic compound layer.

Nagayama specifically teaches the practice of depositing a thin insulation layer 109 between a first electrode 102 and an organic layer 103 in a light-emitting device. The additional layer protects the device from instabilities caused by contaminants and/or an irregular shape of the first electrode (par.0018). In this way, the light emitting device is more immune to manufacturing flaws, thus improving reliability.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the light emitting device of Yamada to have a thin insulation layer between the first electrode and the organic compound layer as shown by Nagayama in order to improve the stability and longevity of the pixel, as taught by Nagayama. As a result of the addition of this

layer, tunneling currents result and the first electrode is not in direct contact with the organic compound layer.

With respect to claims 8-10, the insulating layer of Nagayama is made of silicon oxide or silicon nitride (par.0023).

With respect to claims 14-16, the insulating layer of Nagayama has carbon as a main component (polyimide, a carbon-based polymer, par.0023).

With respect to claims 35-37, the insulating layer of Nagayama has thicknesses overlapping the range of 1-10 nm thick (pars.0015 and 0024).

With respect to claims 41-43, the insulating surface 17 of Yamada is made of at least a polyimide or acrylic resin (col.6, lines 2-4).

With respect to claims 47-49, the light emitting device of Yamada is capable of being used for computers, digital cameras, video cameras and mobile phones. The examiner notes that such limitations result in an intended use of the light emitting device that carry no structural distinction over the prior art of record. Such limitations carry no patentable weight.

Claims 2-7, 14-19, 35-40 and 47-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Urabe (US 6,614,174 B1) in view of Miyauti et al. (JP 11-31587).

Regarding claims 2-7, Urabe discloses a light-emitting device (Figs.1 and 4C), including:

a) a TFT (Fig.1) having a source region S and a drain region D,

b) an interlayer insulating film 50 over the source and drain regions,

c) a drain electrode M connected to the drain region through an opening formed in the interlayer insulating film,

d) a first electrode A formed on the interlayer insulating film and connected to the drain electrode (through CON),

e) a first insulating layer 15 having an opening on the first electrode (Fig.4C) and comprising a tapered edge,

f) an organic compound layer 10 formed on the first electrode, and

g) a second electrode K formed on the organic compound layer.

Urabe does not specifically disclose the use of a second insulation layer between the first electrode and the organic compound. As a result, there is no tunneling current between the first electrode and the organic compound layer, and the first electrode is directly connected to the organic compound layer.

Miyauti specifically teaches the practice of depositing a thin insulation layer 3 (made of DLC) between a first electrode 2 and an organic compound layer 4 and 5 in a light-emitting device. The DLC layer is chemically stable and thus shields the organic compound layer from the instabilities of the underlying electrode 102, see par.0036 of Miyauti.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the light emitting device of Urabe to have a thin insulation layer between the first electrode and the organic compound layer as shown by Miyauti in order to improve the stability and longevity of the pixel, as taught by Miyauti. As a result of the addition of this thin layer, tunneling currents result and the first electrode is not in direct contact with the organic compound layer.

With respect to claims 14-19, the insulating layer of Miyauti has carbon as a main component.

With respect to claims 35-40, the insulating layer of Miyauti (DLC layer 3) has thicknesses overlapping the range of 1-10 nm thick (par.0033, Table 1).

With respect to claims 47-52, the light emitting device of Urabe is capable of being used for computers, digital cameras, video cameras and mobile phones. The examiner notes that such limitations result in an intended use of the light emitting device that carry no structural distinction over the prior art of record. Such limitations carry no patentable weight.

Claims 2-7, 8-25 and 29-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Urabe in view of Nagayama et al. (JP 11-224781).

Regarding claims 2-7, Urabe discloses a light-emitting device (Figs.1 and 4C), including:

a) a TFT (Fig.1) having a source region S and a drain region D,

b) an interlayer insulating film 50 over the source and drain regions,

c) a drain electrode M connected to the drain region through an opening formed in the interlayer insulating film,

d) a first electrode A formed on the interlayer insulating film and connected to the drain electrode (through CON),

e) a first insulating layer 15 having an opening on the first electrode (Fig.4C) and comprising a tapered edge,

f) an organic compound layer 10 formed on the first electrode, and

g) a second electrode K formed on the organic compound layer.

Urabe does not specifically disclose the use of a second insulation layer between the first electrode and the organic compound. As a result, there is no tunneling current between the first electrode and the organic compound layer, and the first electrode is directly connected to the organic compound layer.

Nagayama specifically teaches the practice of depositing a thin insulation layer 109 between a first electrode 102 and an organic layer 103 in a light-emitting device. The additional layer protects the device from instabilities caused by contaminants and/or an irregular shape of the first electrode (par.0018). In this way, the light emitting device is more immune to manufacturing flaws, thus improving reliability.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the light emitting device of Urabe to have a thin insulation layer between the first electrode and the organic compound layer as shown by Nagayama in order to improve the stability and longevity of the pixel, as taught by Nagayama. As a result of the addition of this layer, tunneling currents result and the first electrode is not in direct contact with the organic compound layer.

With respect to claims 8-13, the insulating layer of Nagayama is made of silicon oxide or silicon nitride (par.0023).

With respect to claims 14-19, the insulating layer of Nagayama has carbon as a main component (polyimide, a carbon-based polymer, par.0023).

With respect to claims 20-25, Urabe does not specifically disclose that the interlayer insulating film 50 is made of silicon nitride or silicon oxynitride. The layer is made of silicon oxide. However, Urabe does specifically teach that silicon oxide is not limiting, and that other similar known materials can be used for an insulating layer (col.6, lines 34-37, "silicon dioxide or the like").

Nagayama provides known functional equivalent layers to silicon oxides in par.0023. Specifically, Nagayama equates silicon oxides and silicon nitrides as being equally suitable for an insulating layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the interlayer insulating film of Urabe to be made of silicon nitride as taught by Nagayama as being known functionally equivalent materials and equally suitable to the purpose subject to availability.

With respect to claims 29-34 and 41-46, Urabe does not specifically disclose that either the first insulating layer 15 or the interlayer insulating film 50 is made of a polyimide or acrylic resin. The layer is made of silicon oxide. However, Urabe does specifically teach that silicon oxide is not limiting, and that other similar known materials can be used for an insulating layer (col.6, line 23; col.7, lines 58-65, "silicon dioxide or the like" and "the material…is not specially limited.").

Nagayama provides known functional equivalent layers to silicon oxides in par.0023. Specifically, Nagayama equates silicon oxides and polyimides as being equally suitable for an insulating layer. Furthermore, polyimides are simpler to manufacture, simply requiring a spin coating process rather than vacuum-based vapor deposition processes, which take longer and are more expensive.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for either the first insulating layer or the interlayer insulating film of Urabe to be made of polyimide as taught by Nagayama as being known functionally equivalent materials and equally suitable to the purpose subject to availability, as well as more efficient, cost-effective manufacture.

With respect to claims 35-40, the insulating layer of Nagayama has thicknesses overlapping the range of 1-10 nm thick (pars.0015 and 0024).

With respect to claims 47-52, the light emitting device of Urabe is capable of being used for computers, digital cameras, video cameras and mobile phones. The examiner notes that such limitations result in an intended use of the light emitting device that carry no structural distinction over the prior art of record. Such limitations carry no patentable weight.

Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Urabe and Nagayama, as applied to claims 2-7 above, in view of Yamada.

With respect to all three claims, Urabe discloses an interlayer insulating film of two layers 33 and 50.

However, Urabe does not specifically disclose the practice of making one layer out of a polyimide or acrylic resin, and another layer out of silicon nitride or silicon oxynitride. Urabe discloses that both layers are made of silicon dioxide, and that other known materials may be easily substituted (col.6, lines 1-3 and lines 15-17).

As stated in the above rejections to claims 20-25 and 29-34, the Urabe/Nagayama combination provides known functional equivalent layers to silicon oxides, specifically silicon nitrides and polyimides, as functional equivalents known in the art, and the greater ease of manufacture in the case of using polyimides.

Further regarding claims 26-28, neither Urabe nor Nagayama specifically teach that the first layer is a polyimide and that the second layer is a silicon nitride.

Yamada specifically teaches the practice of having an interlayer insulating film with two layers 15 and 17, where the first layer 17 is a polyimide, being used as an insulating planarization layer, (col.6, lines 21-24), and where the second layer 15 is made at least partially of silicon nitride (col.6, lines 15-19). In this way, a sufficient insulating/passivation layer is formed over the TFT circuitry while providing a planarizing layer of organic resin in order to easily level the structure in order to provide a properly flat surface upon which to form the EL device.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the first and second layers of the interlayer insulating film of Urabe to be made of polyimide and silicon nitride, respectively, in order to provide the necessary insulation and passivation of the TFT structures while providing a simple and cost-effective planar surface upon which to fabricate the EL device.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamada (US 6,246,179 B1) further teaches structure identical to claims 5-7 except for the fact that the anode of the EL device is connected to the source, rather than the drain, of the TFT, as well as the lack of the second insulation layer.

Tang (US 5,550,066) teaches a device structure similar to that of Urabe and Yamada.

Yamada (US 6,072,450) teaches a structure identical to that claimed, including the second insulation layer being used as a barrier and operates under the tunneling effect (col.11,

lines 28-46), except that the first electrode is connected to the source, rather than the drain, of the TFT.

Yamazaki (US 6,583,471 B1), Yamazaki (US 6,903,377 B2) and Inukai (US 6,680,577 B1) are commonly-owned patents disclosing similar structures to that claimed above.

Yuan (US 6,509,574 B2) teaches the known advantages of providing a thin dielectric (insulating) layer between an organic EL layer and a metal electrode (col.2, lines 24-40) for improved electron injection via tunneling.

Kawai (US 6,636,001 B2) teaches the known practice of providing an insulating layer for effecting carrier injection via tunneling.

Tanaka (US 7,042,152 B2) and Okada (US 6,858,271 B1) discuss tunneling effects between organic EL layers and metal electrodes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas R. Artman
Patent Examiner
TRA 8/1/06

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER